## CLAIMS

1. A microfluidic system, comprising:

a first fluid path;

a second fluid path segregated from the first fluid path by a first convection controller at a first contact region;

wherein at least one of the first fluid path and the second fluid path has a cross-sectional dimension of less than about 1mm.

2. The microfluidic system of claim 1, wherein the first fluid path and the second fluid path are substantially tangentially intersecting at the first contact region.

3. The microfluidic system of claim 1, wherein at least one of the first fluid path and the second fluid path is substantially rectangular in cross-section at the first contact region.

4. The microfluidic system of claim 1, wherein the first fluid path and the second fluid path have a crossing angle between about 45 and 135 degrees.

5. The microfluidic system of claim 4, wherein the first fluid path and the second fluid path have a crossing angle of about 90 degrees.

6. The microfluidic system of claim 1, wherein the convection controller is permeable by diffusion.

7. The microfluidic system of claim 6, wherein the convection controller has an affinity for at least one material to be used within the microfluidic system and repulses at least one material to be used within the microfluidic system.

8. The microfluidic system of claim 7, wherein the convection controller carries an electrical charge.

9. The microfluidic system of claim 6, wherein the convection controller comprises pores about 0.05 to 0.2 micrometers in average diameter.

10. The microfluidic system of claim 9, wherein the inhibitor comprises pores about 0.1 micrometers in diameter.

11. The microfluidic system of claim 6, wherein the convection controller comprises a portion about 5 to 50 microns thick.

12. The microfluidic system of claim 11, wherein the convection controller comprises a portion about 10 microns thick.

13. The microfluidic system of claim 6, wherein the convection controller comprises a membrane.

14. The microfluidic system of claim 13, wherein the membrane comprises polycarbonate.

15. The microfluidic system of claim 1, further comprising an interaction material positioned within one of the first fluid path and the second fluid path.

16. The microfluidic system of claim 15, wherein the interaction material is one of a test fluid and an indicator.

17. The microfluidic system of claim 15, wherein the interaction material is immobilized within the one of the first fluid path and the second fluid path.

18. The microfluidic system of claim 1, wherein the convection controller comprises:

a first membrane; and

a second membrane in spaced relation to the first membrane.

19. The microfluidic system of claim 18, wherein the first membrane and the second membrane are no more than 500 micrometers apart.

20. The microfluidic system of claim 19, wherein the first membrane and the second membrane are no more than 250 micrometers apart.

21. The microfluidic system of claim 20, wherein the first membrane and the second membrane are no more than 100 micrometers apart.

22. The microfluidic system of claim 1, further comprising:

a third fluid path segregated from the second fluid path by a second convection controller at a second contact region; and

a fourth fluid path segregated from the first fluid path by a third convection controller at a third contact region and segregated from the third fluid path by a fourth convection controller at a fourth contact region.

23. The microfluidic system of claim 22, wherein the first convection controller, the second convection controller, the third convection controller and the fourth convection controller comprise a single convection controller.

24. The microfluidic system of claim 22, wherein at least one of the first fluid path and the second fluid path comprises a cross-sectional dimension of less than about 300μm.

25. The microfluidic system of claim 24, wherein at least one of the first fluid path and the second fluid path comprises a cross-sectional dimension of less than about 100μm.

26. The microfluidic system of claim 25, wherein at least one of the first fluid path and the second fluid path comprises a cross-sectional dimension of less than about 50μm.

27. The microfluidic system of claim 1, wherein both the first fluid path and the second fluid path have a cross-sectional dimension of less than about 500μm.

28. A fluidic system, comprising:

a first fluid path;

a second fluid path;

a third fluid path segregated from the first fluid path by a convection controller at a first contact region and the second fluid path by a convection controller at a second contact region; and

a fourth fluid path segregated from the first fluid path by a convection controller at a third contact region and segregated from the second fluid flow path by a fourth convection controller at a fourth contact region.

29. A fluidic array, comprising:

a first set of fluid paths arranged generally parallel to one another;

a second set of fluid paths arranged generally parallel to one another and crossing the first set of fluid paths such that a plurality of contact regions are formed between at least some of the fluid paths in the first set of fluid paths and at least some of the fluid paths in the second set of fluid paths; and

a convection controller segregating one of the first set of fluid paths from one of the second set of fluid paths at the contact region.

30. A method of promoting interaction, comprising:

introducing a first fluid including a first material into a first fluid path having a cross-sectional dimension of less than 1 millimeter;

introducing a second fluid including a second material into a second fluid path segregated from the first fluid path by a convection controller at a contact region; and

allowing the first and second materials to interact at the contact region.

31. The method of promoting interaction of claim 30, further comprising maintaining a pressure within the first fluid path at the contact region substantially equal to a pressure within the second fluid path at the contact region.

32. The method of promoting interaction of claim 30, further comprising diffusing at least one of the first material and the second material into the convection controller.

33. The method of promoting interaction of claim 30, further comprising flowing at least one of the first fluid through the first fluid path and the second fluid through the second fluid path.

34. The method of promoting interaction of claim 30, further comprising immobilizing at least one of the first fluid in the first fluid path and the second fluid in the second fluid path.

35. The method of promoting interaction of claim 30, wherein the first fluid is the first material.

36. The method of promoting interaction of claim 30, wherein the second fluid is the second material.

37. A method of immobilizing a material in a microfluidic system, comprising:

introducing an immobilizer containing the material into a fluid path having a cross-sectional dimension of less than about 1 millimeter.

38. The method of immobilizing a material in a microfluidic system of claim 37, wherein introducing the immobilizer comprises flowing an immobilizer comprising a flowable gel into the fluid path.

39. The method of immobilizing a material in a microfluidic system of claim 37, wherein introducing the immobilizer comprises flowing the immobilizer into the fluid path and allowing the immobilizer to set within the fluid path.

40. A microfluidic system, comprising

a fluid path having a cross-sectional dimension of less than about 1 millimeter;

an immobilizer positioned within the fluid path.

41. The microfluidic system of claim 40, wherein the immobilizer comprises a gel.

42. The microfluidic system of claim 41, wherein the immobilizer comprises a flowable gel.

43. The microfluidic system of claim 40, wherein the immobilizer comprises a test material.

44. The microfluidic system of claim 40, wherein the immobilizer comprises an indicator material.

45. The microfluidic system of claim 40, wherein at least 5% of the fluid path is occupied by the immobilizer at least one point in the fluid path.

46. The microfluidic system of claim 45, wherein at least 25% of the fluid path is occupied by the immobilizer at least one point in the fluid path.

47. The microfluidic system of claim 46, wherein at least 50% of the fluid path is occupied by the immobilizer at least one point in the fluid path.

48. A method of patterning a material on a substrate, comprising:

placing a first fluid path in fluid contact with the substrate;

flowing a fluid comprising the material into the first fluid path;

immobilizing at least a portion of the material within the first fluid path;

removing the first fluid path from the substrate, leaving at least a portion of the immobilized material in contact with the substrate; and

placing a second fluid path in fluid contact with the substrate such that the second fluid path is in fluid contact with at least a portion of the immobilized material.

49. The method of claim 48, wherein immobilizing further comprises adsorbing a portion of the fluid onto the substrate.

50. The method of claim 48, wherein removing comprises removing the fluid path from the substrate such that the immobilized material is not substantially damaged.

51. The method of claim 48, wherein placing further comprises placing a first plurality of fluid paths in contact with the substrate and flowing further comprises flowing a plurality of fluids into the first plurality of fluid paths.

52. The method of claim 48, wherein placing a first fluid path further comprises placing a first fluid path having a cross-sectional dimension of less than 1 millimeter in fluid contact with the substrate.

53. A fluidic device, comprising:

a substrate with a material patterned thereon; and

a fluid path in fluid contact with the substrate such that the fluid path is in fluid contact with at least a portion of the material.

54. The fluidic device of claim 53, wherein the material is patterned onto the substrate in at least one strip.

55. The fluidic device of claim 54, wherein the material is patterned onto the substrate in a plurality of strips.

56. The fluidic device of claim 55, wherein at least portions of the plurality of strips are substantially linear.

57. The fluidic device of claim 56, wherein the portions of the plurality of strips that are substantially linear are substantially parallel.

58. The fluidic device of claim 53, further comprising a plurality of fluid paths.

59. The fluidic device of claim 58, wherein at least potions of the plurality of fluid paths are substantially linear.

60. The fluidic device of claim 59, wherein the portions of the plurality of fluid paths that are substantially linear are substantially parallel.

61. The fluidic device of claim 60, wherein the material is patterned onto the substrate in a plurality of strips, at least portions of the plurality of strips are substantially linear, substantially parallel, and substantially perpendicular to the portions of the plurality of fluid paths that are substantially linear and parallel.

62. A method of promoting interaction, comprising:

providing a fluidic system comprising a fluid path having a cross-sectional dimension of less than one millimeter and a first interaction material patterned therein; and

flowing a fluid comprising a second interaction material into the fluid path to allow interaction between the first and second interaction materials.

63. The method of claim 62, further comprising:

observing the interaction of the first and second interaction materials.

64. The method of claim 62, wherein providing further comprises providing a fluidic system comprising a plurality of fluid paths and a first plurality of interaction materials patterned within them and wherein flowing further comprises flowing a plurality of fluids comprising a second plurality to interaction materials into the plurality of fluid paths.

65. A gradient generation apparatus, comprising:

at least first, second, and third fluid paths each having a cross-section of less than one millimeter, the second and third fluid paths each comprising a mixing region;

a first inlet fluidly connected to the first and second fluid paths;

a second inlet fluidly connected to the second and third fluid paths; and

a first connecting path fluidly connected to the second fluid path downstream of its mixing region and fluidly connected to the third fluid path upstream of its mixing region.

66. The gradient generation apparatus of claim 65, wherein the first and second fluid paths are sized and arranged such that fluid introduced into the first inlet is divided evenly between them.

67. The gradient generation apparatus of claim 66, wherein the second and third fluid paths are sized and arranged such that fluid introduced into the second inlet is divided evenly between them.

68. The gradient generation apparatus of claim 65, further comprising:

a fourth fluid path fluidly connected to the second inlet and a mixing region; and

a second connecting path connected to the third fluid path downstream of its mixing region and connected to the fourth fluid path upstream of its mixing region.

69. The gradient generation apparatus of claim 68, wherein the second, third and fourth fluid paths are sized and arranged such that fluid introduced into the second inlet is divided evenly between them.

70. The gradient generation apparatus of claim 65, wherein the mixing region comprises a static mixer.

71. The gradient generation apparatus of claim 70, wherein the static mixer comprises a chaotic advective mixer.

72. The gradient generation apparatus of claim 65 further comprising a sensor associated with at least one of the fluid paths.

73. The gradient generation apparatus of claim 72 further comprising a plurality of sensors, each of which is associated with a fluid path.

74. The gradient generation apparatus of claim 72 wherein the sensor is in fluid communication with the at least one fluid path.

75. The gradient generation apparatus of claim 74 wherein the sensor comprises an electrode.

76. The gradient generation apparatus of claim 73 wherein each sensor is in communication with a microprocessor.

77. A method comprising:

flowing a first fluid into a first channel;

flowing a second fluid into a second channel;

mixing at least a portion of the first fluid with a portion of the second fluid in a third channel to form a third fluid;

mixing at least a portion of the third fluid with a portion of the second fluid to form a fourth fluid;

flowing the third fluid past a first sensor; and

flowing the fourth fluid past a second sensor

78. The method of claim 77 further comprising sensing a property of the third fluid and sensing a property of the fourth fluid.

79. The method of claim 78 wherein sensing a property of the third fluid and sensing a property of the fourth fluid occur substantially simultaneously.

80. The method of claim 78 wherein the first fluid comprises a sample and the second fluid comprises a reagent.

81. The method of claim 78 wherein the first fluid comprises a reagent and the second fluid comprises a sample.

82. The method of claim 77 wherein at least one of the channels is a microfluidic channel.

83. An apparatus, comprising:

at least first, second, and third fluid paths each having an inlet end and a region downstream from the inlet end;

the inlet of the first fluid path being fluidly connectable to a first source of fluid;

the inlets of the second and third fluid paths being fluidly connectable to a second source of fluid;

a first connecting path fluidly connecting the first fluid path and the second fluid path downstream of the inlet end of each; and

a second connecting path fluidly connecting the second fluid path and the third fluid path downstream of the inlet end of each, and downstream of the connection of the second fluid path to the first connecting path.

84. The apparatus of claim 83, wherein the third fluid path is not connected to any other fluid path between its inlet and its connection to the second connecting fluid path.

85. A method comprising:

flowing a first fluid in a first channel and a second fluid in a second channel and in a third channel;

mixing at least a portion of the first fluid with the second fluid in the second channel to produce a third fluid; and

mixing at least a portion of the third fluid with the second fluid in the third channel to produce a fourth fluid.

86. The method of claim 85 further comprising flowing the second fluid in a fourth channel and mixing at least a portion of the fourth fluid with the second fluid in the fourth channel to produce a fifth fluid.

87. The method of claim 85 wherein all of the second fluid in the second channel is mixed with the at least a portion of the first fluid to produce the third fluid.

88. The method of claim 85 further comprising sensing the third fluid and the fourth fluid.

89. The method of claim 88 wherein the third and fourth fluids are sensed concurrently.